



Product Features

Analysis of Wide Range of Designs

- ▶ Bondwire and C4 (flipchip) packages
- ▶ Leadframe packages, BGA packages and printed circuit boards (PCBs)
- ▶ Stack die and other multi-die configurations
- ▶ System-in-package designs:
 - Combination of flipchip and bondwire designs
 - Package-on-package (PoP)
 - Package-in-package (PiP)
 - Combination of die-up and die-down designs
- ▶ Package-on-PCB

Model-Building

- ▶ Direct interface to Cadence® Allegro® database (*.mcm, *.brd formats)
- ▶ Import of gerber data generated from layout tools
- ▶ "Node" object for arbitrary source and sink definition
- ▶ Optional specification of external ground plane(s) in ANSYS Icemax model

Detailed, 3-D Models for Bondwires, Solderballs, Solderbumps and Vias

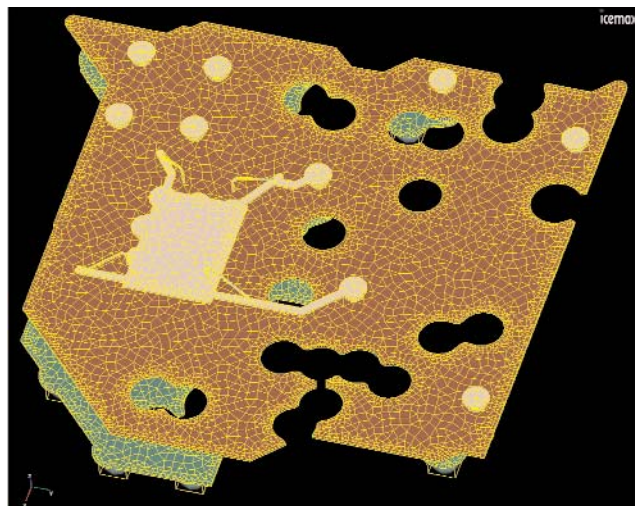
- ▶ 4-point and 5-point JEDEC standards for 3-D representation of bond wire profiles
- ▶ Buried, blind and through-hole vias with percentage fill input
- ▶ Spherical or cylindrical models for solderballs and solderbumps

System-in-Package Analysis: Easy-to-Use Interface, Compatible with Layout Tools, Robust Solver

ANSYS® Icemax® software is the most advanced parasitic extraction tool for analyzing complex integrated circuit (IC) package designs. ANSYS Icemax is based on state-of-the-art finite volume field solver technologies, which allow quick and accurate electrical performance characterization of IC packages. Using ANSYS Icemax tools, engineers and researchers involved in IC package design and analysis can easily generate reliable parasitic parameters for the entire package in a matter of minutes. Output is available in matrix, SPICE, or IBIS formats for signal integrity, power integrity and simultaneous switching noise analysis.

Fast, Accurate, 3-D Finite Volume Field Solver

ANSYS Icemax software uses robust and proven 3-D finite volume algorithms that reduce electromagnetic field solution time by several orders of magnitude. ANSYS Icemax therefore makes it practical to characterize the entire package for high-density, multi-layer flip chip ball grid arrays (BGAs). Complex ground/power planes can be analyzed easily using customized meshing and solution schemes. ANSYS Icemax results have been benchmarked against analytical, numerical and experimental results.



Optimized tri/quad meshing for package and PCB structures

Product Features

Graphics Capabilities

- ▶ Fully interactive model viewing for full package or selected nets
- ▶ Mesh display in CAD window
- ▶ On-screen display of coordinates
- ▶ Global positioning option for individual substrates
- ▶ Automatic alignment and connection for multiple design cases (e.g., stacked packages or package-on-PCB models)

Solver and Meshing

- ▶ Advanced geometry cleanup algorithms
- ▶ Hybrid quad/tri meshing scheme
- ▶ Full package or critical net extraction
- ▶ Automatic detection of nearest neighbors for mutual computations
- ▶ Selection of internal ground/power nets as reference for signal nets
- ▶ Fast finite-volume field solver with multigrid acceleration
- ▶ Multi-level, multi-port net simulation
- ▶ Distributed/parallel capabilities for meshing and solution
- ▶ Batch execution of solver jobs
- ▶ DC IR drop studies on power/ground nets

Post-processing and Reporting

- ▶ Viewing and reporting results at arbitrary frequency
- ▶ RLCG output
- ▶ Automatic ground matrix reduction
- ▶ Lumped or distributed equivalent circuit output
- ▶ Layer-by-layer net length report
- ▶ Multiple SPICE topology options (T-model, Pi-model, L-model)
- ▶ W-element SPICE output
- ▶ S-parameter export in touchstone format
- ▶ Automatic report generation (Microsoft® Excel® and HTML formats)

Supported Platforms

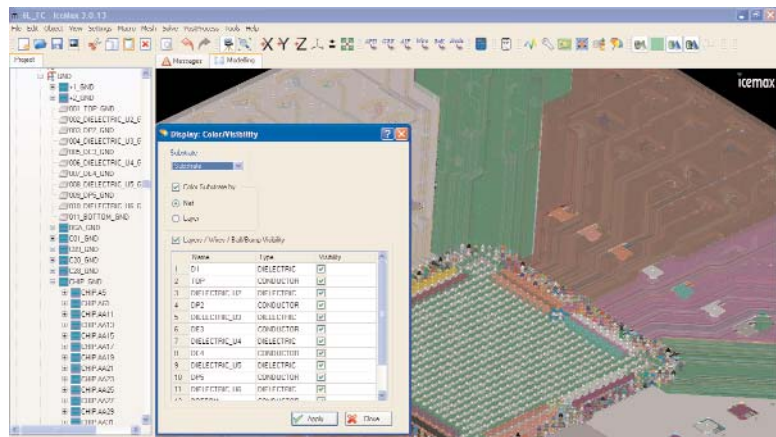
- ▶ Microsoft® Windows XP, 32/64 bit
- ▶ Linux, 32/64 bit

Easy-to-Use, Menu-Driven Modeling Interface

The ANSYS Icemax modeling interface is very easy to use. The software eliminates the major bottleneck in the model-building process by being compatible with all EDA platforms used across the IC package design industry. Using super-fast geometry processing engines, ANSYS Icemax software works directly on industry standard layout data and generates full 3-D numerical models in a matter of minutes. No special expertise or training is required for working with even the most complex package models. Model-building tasks are reduced to a series of simple steps that include:

- ▶ Importing layout information and defining the stack-up
- ▶ Assigning material properties
- ▶ Including bond wire, solder bump and solder ball geometry

All the above steps are performed through an intuitive tool interface that leads the user through the definition of the complete three-dimensional package geometry. The user needs only to specify the operating frequency, the net to be simulated (or the entire package) and the number of neighbors to be included in the simulation.



User interface focused on system-in-package designs

Circuit Simulation Ready Output

In addition to providing results in a report-ready format, ANSYS Icemax software is able to generate an equivalent circuit model, which can be exported in SPICE or IBIS formats to perform signal integrity, power integrity and simultaneous switching noise analysis.